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Description

This invention relates to a rail grinding apparatus for grinding the welded joints of railroad rails. More particularly, it relates to a rail grinding apparatus which does not require the exertion of any significant force by the operator of the apparatus.

The rails of modern railroads are usually connected with one another by butt welding. Various butt welding methods are employed, including gas pressure welding, flash butt welding, thermit welding, and enclosed arc welding. Figure 1 is a side view of two rails 1 which have been connected by conventional butt welding, and Figure 2 is a cross-sectional view taken along Line II-II of Figure 1. As shown in these figures, a weld bead is formed around the entire periphery of the joint between the two rails 1. The weld bead extends considerably above the surface of the rails 1, so it must be removed by grinding. Conventionally, the weld bead is removed from the weld joint using a hand grinder. A surface hand grinder is used to grind the top surface 12, while common hand grinders are used to grind the gage corner surfaces 13 and the upper lateral surfaces 14 of the rails 1. Two different types of grinders must be used. These grinders are hereunder collectively referred to merely as "hand grinders".

Furthermore, the contact force between a hand grinder and the surface of the rails 1 must be exerted by the operator of the hand grinder. As it is difficult for an operator to exert a steady contact force, hand grinding often produces irregularities in the surface of the rails 1, and it is difficult to obtain a finished surface having the required surface tolerance of -0.1 - +0.3 mm/m. Hand grinding also produces an unpleasant shrill noise, which is objectionable from the standpoint of both the operator of the hand grinder and others working nearby. Furthermore, a hand grinder generates vibrations which are not only fatiguing to an operator and prevent him from working for long periods but which also may cause the operator to develop medical problems, such as Raynaud's phenomenon.

Accordingly, it is an object of the present invention to provide a rail grinding apparatus for railroads rails which can grind the surface of a rail without an operator having to exert any significant force.

It is another object of the present invention to provide a rail grinding apparatus which can provide a uniform finished surface.

It is yet another object of the present invention to provide a rail grinding apparatus which produces little noise.

It is a further object of the present invention to provide a rail grinding apparatus which imparts little vibration to the hands of an operator.

Patent GB 817826 (see preamble of claim 1) describes a rail-grinding machine arranged to be supported on the rail surface by two sets of rollers mounted with their axes of rotation perpendicular to one another.

The rail grinding apparatus of the present invention, which is defined in the appended claims, has a frame equipped with rolling support members, such as rollers or wheels, which support the frame while rolling along the surface of a rail. A rotary grinding device, such as a motor-driven grinding belt or a grinding wheel, is mounted on the frame such that the grinding device can grind the surface of a rail when the rolling support members are resting on the rail. The rolling support member carries all or substantially all of the weight of the grinding apparatus, and the force of contact between the grinding device and the rail is produced by the weight of the grinding apparatus. The grinding apparatus can be rolled along a rail by being lightly pushed by an operator, and the operator does not have to exert any significant force on the grinding apparatus during operation. The grinding device may be surrounded by a guard which protects the operator and reduces the level of noise generated by the grinding apparatus.

Figure 1 is an elevation of a pair of railroad rails which have been connected by butt welding.

Figure 2 is a cross-sectional view taken along Line II-II of Figure 1.

Figure 3 is a perspective view of an embodiment of a rail grinding apparatus according to the present invention when grinding the top surface of a rail.

Figure 4 is an end view of the rail grinding apparatus of Figure 3 when grinding the gage corner surface of a rail.

Figure 5 is an end view of the rail grinding apparatus of Figure 3 when grinding the upper lateral surface of a rail.

A preferred embodiment of a rail grinding apparatus according to the present invention will now be described while referring to the accompanying drawings. Figure 3 illustrates this embodiment when grinding the top surface 12 of a rail 1. The rail grinding apparatus, which is indicated by reference numeral 2, has a support frame 3 which may have a number of openings formed therein to enable it to be easily grasped by an operator. Rotating support members in the form of first and second rollers 41 and 42 are rotatably mounted on the lower portions of the front end (the left end in Figure 3) and the rear end of the frame 3. The first rollers 41 extend perpendicularly from the frame 3, while the second rollers 42 extend downwards in the plane of the frame 3. As shown in Figure 3, when grinding the top surface 12 of a rail 1, the

first rollers 41 sit on the surface 12 of the rail 1 and support the weight of the grinding apparatus 2, while the second rollers 42 contact the upper lateral surfaces 14 of the rail 1. The front end of the frame 3 includes an adjusting screw 31 which enables the height of the front end to be adjusted.

A rotary grinding device in the form of a grinding belt 23 is wrapped around a pair of pulleys 21 and 22 which are rotatably mounted on the frame 3. The pulleys 21 and 22 extend perpendicularly from the frame 3 parallel to the first rollers 41. The front pulley 22 is preferably made of an elastic material such as rubber so that the grinding belt 23 will be resiliently pressed against the rail 1 by the pulley 22. The rear pulley 21 is rotated by an electric motor 24 which is mounted on the frame 3, and the rotation of the rear pulley 21 is transmitted to the front pulley 22 by the grinding belt 23. The tension in the grinding belt 23 can be adjusted by a conventional tensioning mechanism 25 which is secured to the frame 3. The motor 24 can be controlled by a switch box 7 which is incorporated into the upper portion of the frame 3.

The pulleys 21 and 22 and the grinding belt 23 are covered by a protective cover 5 which prevents clothing and other items from becoming caught in the pulleys 21 and 22 and also protects the operator from grinding sparks. The cover 5 can also greatly reduce the level of noise which is generated by the grinding apparatus. A guard plate 6 is secured to the underside of the protective cover 5 just to the rear of the rear pulley 21 to protect the rear rollers 41 and 42 from grinding sparks.

The force of contact between the grinding belt 23 and the rail 1 can be adjusted by the adjusting screw 31. As this force is provided by the weight of the grinding apparatus 2, which is constant, grinding can be performed with a uniform grinding force, so a uniform surface finish can be obtained.

When grinding the top surface 12 of a rail 1, the operator rolls the grinding apparatus 2 along the rail 1 to a welded joint. When rolling the grinding apparatus 2 from joint to joint, it may be desirable to adjust the adjusting screw 31 so that the grinding belt 23 is completely separated from the surface of the rail 1 to reduce frictional resistance. When the weld joint to be subjected to grinding is reached, the adjusting screw 31 is adjusted to produce a suitable contact force between the grinding belt 23 and the rail 1. The operator then turns on the motor 24 to rotate the grinding belt 23. While the grinding belt 23 is turning, the operator may want to move the frame 3 in the lengthwise direction of the rail 1 back and forth over the joint. When the first rollers 41 are rolling on the top surface 12 of a rail 1, the second rollers 42 act as guide rollers and help the operator to keep the grinding apparatus 2 atop the rail 1. As the weight of the grinding apparatus 2 is entirely supported by the first rollers 41 and the grinding force is provided by the weight of the grinding apparatus 2, the operator has to exert very little force on the grinding apparatus 2 and is not subjected to harmful vibrations.

When grinding the gage corner surfaces 13 of a rail 1, the frame 3 is tilted as shown in Figure 4 so that the first and second rollers 41 and 42 rest on the gage corner surfaces 13 on opposite sides of the rail 1. In this attitude, the motor 24 is turned on to grind the gage corner surface 13 on which the first roller 41 is resting. When it is desired to grind the gage corner surface 13 on the other side of the rail 1, the grinding apparatus 2 is repositioned so that the first rollers 41 rest on the other side.

When grinding the upper lateral surface 14 of a rail, the frame 3 is tilted until it is horizontal as shown in Figure 5. In this state, the first rollers 41 contact the upper lateral surface 14 which is to be subjected to grinding, and the second rollers 42 rest on the top surface 12 of the rail.

Claims

1. Rail grinding apparatus comprising a rotary grinding device (23), front and rear support rollers (41) arranged to support the grinding device on the rail surface and front and rear second rollers (42) mounted with their axes of rotation perpendicular to the axis of rotation of the support rollers, characterised in that the grinding device and the support rollers and second rollers are mounted on a frame (3) extending generally perpendicular to the axes of rotation of the support rollers, the axes of rotation of the second rollers are fixed with reference to the frame (3) such that the frame may be tilted along the lateral surface of the rail together with the grinding device, and adjusting means (31) is provided for adjusting the position of a support roller with respect to the frame and thus the height of the grinding device above the rail.

2. Rail grinding apparatus according to claim 1 in which the adjusting means (31) is an adjusting screw adjusting the height of the front support roller.

3. A rail grinding apparatus as claimed in claims 1 and 2 wherein the rotary grinding device comprises:

a pair of pulleys (21,22) which are rotatably mounted on the frame (3);

a grinding belt (23) which is wrapped around the pulleys (21,22); and a motor (24) for

rotating the pulleys.

4. A rail grinding apparatus as claimed in any preceding claims further comprising a noise guard (5) which surrounds the rotating grinding device.

5. A rail grinding apparatus as claimed in any one of claims 2 to 4 wherein one of the pulleys (21,22) is made of an elastic material.

Patentansprüche

1. Schienen-Schleifvorrichtung, mit einer drehbaren Schleifeinrichtung (23), vorderen und hinteren Stützrollen (41) zum Abstützen der Schleifeinrichtung auf der Schienenoberfläche und vorderen und hinteren zweiten Rollen (42), die mit ihren Drehachsen senkrecht zu der Drehachse der Stützrollen angeordnet sind, dadurch **gekennzeichnet**, daß die Schiefeinrichtung und die Stützrollen und zweiten Rollen an einem Rahmen (3) angebracht sind, der sich im wesentlichen senkrecht zu den Drehachsen der Stützrollen erstreckt, daß die Drehachsen der zweiten Rollen in bezug auf den Rahmen (3) derart befestigt sind, daß der Rahmen nach wie vor entlang der seitlichen Oberflache der Schiene zusammen mit der Schleifeinrichtung gekippt werden kann, und daß eine Einstelleinrichtung (31) vorgesehen ist zum Einstellen der Position der Stützrollen in bezug auf den Rahmen und damit der Höhe der Schleifeinrichtung über der Schiene.

2. Schienen-Schleifvorrichtung gemäß Anspruch 1, bei der die Einstelleinrichtung (31) eine Einstellschraube ist, die die Höhe der vorderen Stützrolle einstellt.

3. Schienen-Schieifvorrichtung gemäß Anspruch 1 und 2, bei der die drehbare Schleifeinrichtung umfaßt;

zwei Riemenscheiben (21,22), die drehbar an dem Rahmen (3) angebracht sind;

einen Schleifriemen (23), der um die Riemenscheiben (21,22) herumgelegt ist, und einen Motor (24) zum Drehen der Riemenscheiben.

4. Schienen-Schleifvorrichtung nach einem der vorhergehenden Ansprüche, mit einem Lärmschutz (5), der die drehbare Schleifeinrichtung umgibt.

5. Schienen-Schieifvorrichtung nach einem der Ansprüche 2 bis 4, bei der eine der Riemenscheiben (21,22) aus elastischem Material besteht.

Revendications

1. Appareil de meulage de rails comprenant un dispositif de meulage rotatif (23), des rouleaux porteurs avant et arrière (41) disposés de façon à supporter le dispositif de meulage sur la surface de rail et des seconds rouleaux avant et arrière (42) montés de façon que leurs axes de rotation soient perpendiculaires à l'axe de rotation des rouleaux porteurs, caractérisé en ce que le dispositif de meulage et les rouleaux porteurs et les seconds rouleaux sont montés sur un bâti (3) s'étendant généralement perpendiculairement aux axes de rotation des rouleaux porteurs, les axes de rotation des seconds rouleaux sont fixés par rapport au bâti (3) de telle sorte que le bâti puisse être incliné le long de la surface latérale du rail en même temps que le dispositif de meulage, et il est prévu un moyen de réglage (31) pour ajuster la position d'un rouleau porteur par rapport au bâti, et pour régler par conséquent la hauteur du dispositif de meulage au-dessus du rail.

2. Appareil de meulage de rails selon la revendication 1, dans lequel le moyen de réglage (31) est une vis de réglage pour régler la hauteur du rouleau porteur avant.

3. Appareil de meulage de rails tel que revendiqué dans les revendications 1 et 2, dans lequel le dispositif de meulage rotatif comprend :
   - une paire de poulies (21, 22) qui sont montées de façon tournante dans le bâti (3) ;
   - une courroie de meulage (23) qui est enroulée autour des poulies (21, 22) ;
   - et un moteur (24) pour faire tourner les poulies.

4. Appareil de meulage de rails tel que revendiqué dans une quelconque des revendications précédentes, comprenant en outre un protecteur anti-bruit (5) qui entoure le dispositif de meulage rotatif.

5. Appareil de meulage de rails tel que revendiqué dans une quelconque des revendications 2 à 4, dans lequel une des poulies (21, 22) est formée d'un matériau élastique.

FIGURE 1

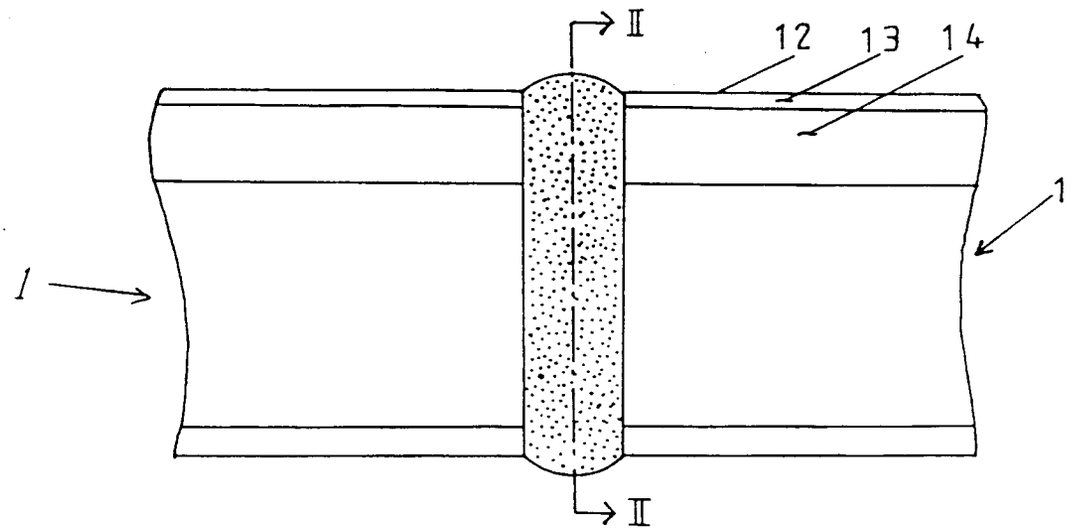


FIGURE 2

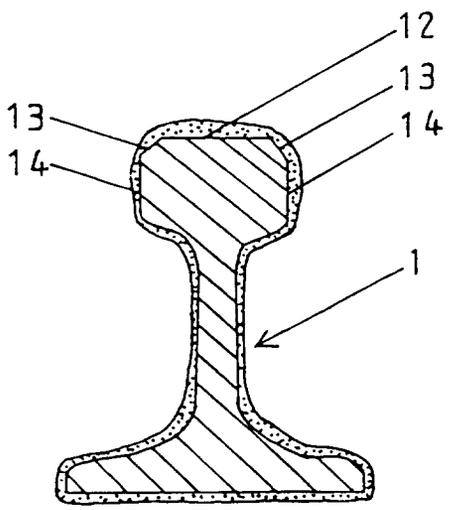


FIGURE 3

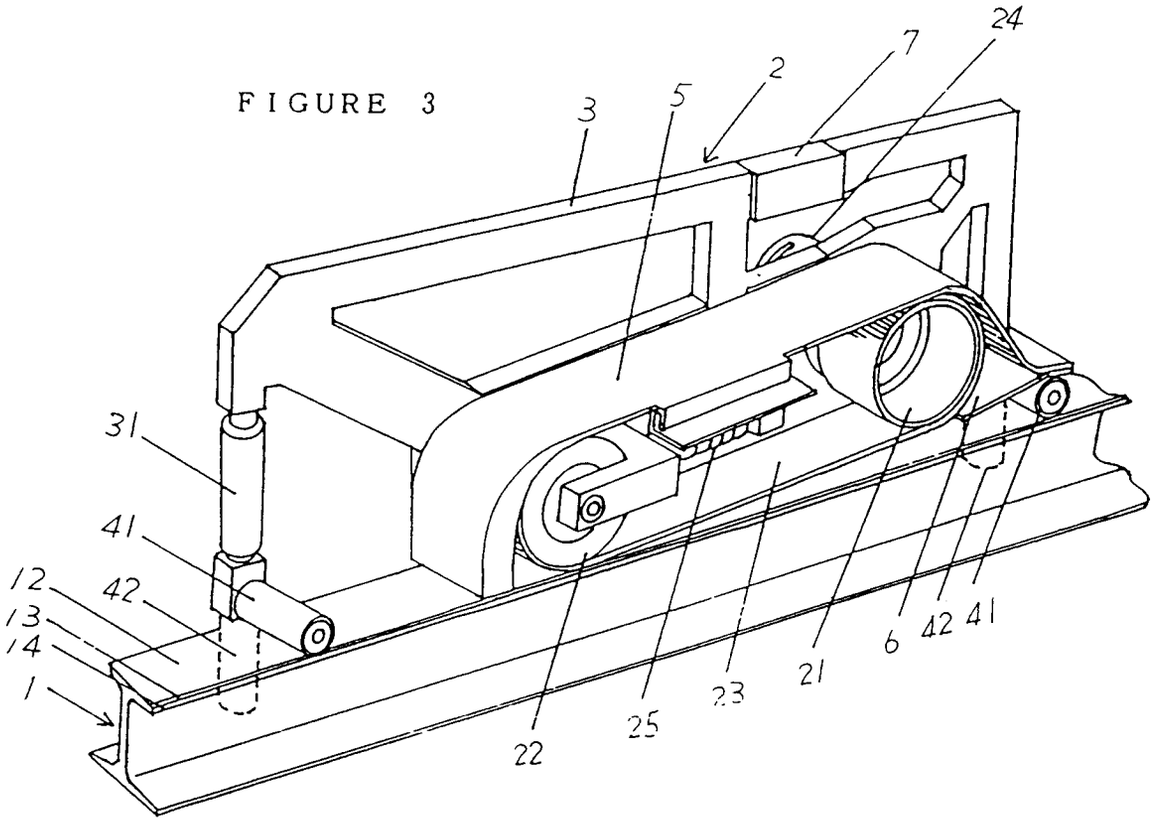


FIGURE 4

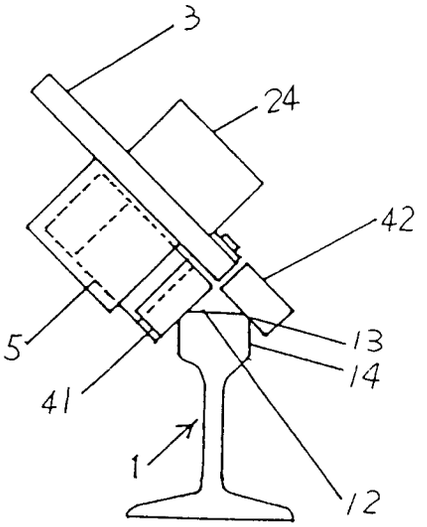


FIGURE 5

